

A Year of Progress: NASA's Space Launch System Approaches Critical Design Review

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Abstract

NASA's Space Launch System (SLS) made significant progress on the manufacturing floor and on the test stand in 2014 and positioned itself for a successful Critical Design Review in mid-2015. SLS, the world's only exploration-class heavy lift rocket, has the capability to dramatically increase the mass and volume of human and robotic exploration. Additionally, it will decrease overall mission risk, increase safety, and simplify ground and mission operations – all significant considerations for crewed missions and unique high-value national payloads. Development now is focused on configuration with 70 metric tons (t) of payload to low Earth orbit (LEO), more than double the payload of the retired Space Shuttle program or current operational vehicles. This "Block 1" design will launch NASA's Orion Multi-Purpose Crew Vehicle (MPCV) on an uncrewed flight beyond the Moon and back and the first crewed flight around the Moon. The current design has a direct evolutionary path to a vehicle with a 130t lift capability that offers even more flexibility to reduce planetary trip times, simplify payload design cycles, and provide new capabilities such as planetary sample returns. Every major element of SLS has successfully completed its Critical Design Review and now has hardware in production or testing. In fact, the SLS MPCV-to-Stage-Adapter (MSA) flew successfully on the Exploration Flight Test (EFT) 1 launch of a Delta IV and Orion spacecraft in December 2014. The SLS Program is currently working toward vehicle Critical Design Review in mid-2015. This paper will discuss these and other technical and programmatic successes and challenges over the past year and provide a preview of work ahead before the first flight of this new capability.